



eFigure 1. Schematic of inclusion and exclusion criteria

eTable 1. Sensitivity analysis I: Uninsured at 10, 25, 50, and 150% of the national Medicaid rate

| | | Estimated annual number of outpatient visits nationwide | 90% CI for national burden | |
|-------------------------|-----------------------------|--|----------------------------|-------------|
| Ambulatory ED | Overall 10% Medicaid | 376,903.3 | 370,454.9 | 383,351.7 |
| | Overall 25% | 382,887.3 | 376,130.9 | 389,643.7 |
| | Overall 50% | 392,860.7 | 385,591.1 | 400,130.3 |
| | Overall 150% | 432,754.1 | 423,431.5 | 442,076.6 |
| Urgent care | Overall 10% Medicaid | 35,230.1 | 34,697.1 | 35,763.1 |
| | Overall 25% | 35,563.9 | 35,013.7 | 36,114.1 |
| | Overall 50% | 36,120.3 | 35,541.4 | 36,699.1 |
| | Overall 150% | 38,345.6 | 37,652.3 | 39,039.0 |
| Office visit | Overall 10% Medicaid | 770,230.2 | 758,916.8 | 781,543.5 |
| | Overall 25% | 776,429.7 | 764,797.3 | 788,062.0 |
| | Overall 50% | 786,762.1 | 774,598.0 | 798,926.2 |
| | Overall 150% | 828,091.9 | 813,801.0 | 842,382.9 |
| Any presentation | Overall 10% Medicaid | 1,182,350.2 | 1,164,055.4 | 1,200,645.0 |
| | Overall 25% | 1,194,868.3 | 1,175,929.3 | 1,213,807.3 |
| | Overall 50% | 1,215,731.8 | 1,195,719.1 | 1,235,744.5 |
| | Overall 150% | 1,299,185.9 | 1,274,878.5 | 1,323,493.2 |
| Outpatient only | Overall 10% Medicaid | 805,460.3 | 793,614.0 | 817,306.7 |
| | Overall 25% | 811,993.6 | 799,811.1 | 824,176.2 |
| | Overall 50% | 822,882.4 | 810,139.5 | 835,625.3 |
| | Overall 150% | 866,437.6 | 851,453.3 | 881,421.9 |

eTable 2. Sensitivity analysis II: Possible misclassification at 5, 10, and 20% over- or underestimation

| | | Estimated annual number of outpatient visits nationwide | 90% CI for national burden | |
|-------------------------|---------------------------|--|----------------------------|-------------|
| Ambulatory ED | 20% Overestimation | 330,245.9 | 323,609.0 | 336,882.7 |
| | 10% | 371,526.6 | 364,060.2 | 378,993.1 |
| | 5% | 392,167.0 | 384,285.7 | 400,048.3 |
| | 5% Underestimation | 433,447.7 | 424,736.9 | 442,158.6 |
| | 10% | 454,088.1 | 444,962.4 | 463,213.8 |
| | 20% | 495,368.8 | 485,413.6 | 505,324.1 |
| Urgent care | 20% Overestimation | 29,786.3 | 29,277.5 | 30,295.2 |
| | 10% | 33,509.6 | 32,937.2 | 34,082.1 |
| | 5% | 35,371.3 | 34,767.0 | 35,975.6 |
| | 5% Underestimation | 39,094.6 | 38,426.7 | 39,762.5 |
| | 10% | 40,956.2 | 40,256.6 | 41,655.9 |
| | 20% | 44,679.5 | 43,916.3 | 45,442.8 |
| Office visit | 20% Overestimation | 645,941.66 | 635,359.6 | 656,523.6 |
| | 10% | 726,684.3 | 714,779.6 | 738,589.1 |
| | 5% | 767,055.7 | 754,489.5 | 779,621.8 |
| | 5% Underestimation | 847,798.4 | 833,909.5 | 861,687.3 |
| | 10% | 888,169.7 | 873,619.5 | 902,720.0 |
| | 20% | 968,912.4 | 953,039.4 | 984,785.5 |
| Any presentation | 20% Overestimation | 1,005,967.1 | 988,239.1 | 1,023,695.1 |
| | 10% | 1,131,713.0 | 1,111,769.0 | 1,151,657.0 |
| | 5% | 1,194,585.9 | 1,173,533.9 | 1,215,637.9 |
| | 5% Underestimation | 1,320,331.8 | 1,297,063.8 | 1,343,599.8 |
| | 10% | 1,383,204.7 | 1,358,828.7 | 1,407,580.7 |
| | 20% | 1,508,950.6 | 1,482,358.6 | 1,535,542.6 |
| Outpatient only | 20% Overestimation | 675,728.0 | 664,637.1 | 686,818.9 |
| | 10% | 760,194.0 | 747,716.8 | 772,671.2 |
| | 5% | 802,427.0 | 789,256.6 | 815,597.4 |
| | 5% Underestimation | 886,893.0 | 872,336.2 | 901,449.8 |
| | 10% | 929,126.0 | 913,876.1 | 944,376.0 |
| | 20% | 1,013,592.0 | 996,955.7 | 1,030,228.3 |

eTable 3. Comparison of annual rates of head trauma presentations between 2010-2012 MarketScan and weighted national rates from 2010-2012 HCUP NIS/NEDS data

| Age group | Annual rate per 100,000 enrollees/population* |
|--|---|
| (Tier 2) Head injury-related hospitalizations (died or survived) | |
| 2010 HCUP NIS: 0-17 years (overall) | 58.7 |
| Private Insurance | 54.0 |
| Medicaid | 65.4 |
| Uninsured | 35.8 |
| 2011 HCUP NIS: 0-17 years (overall) | 38.1 |
| Private Insurance | 33.8 |
| Medicaid | 44.3 |
| Uninsured | 21.5 |
| 2012 HCUP NIS: 0-17 years (overall) | 42.8 |
| Private Insurance | 37.4 |
| Medicaid | 50.6 |
| Uninsured | 22.5 |
| 2010 MarketScan: 0-17 years | 46.3 |
| 2011 MarketScan: 0-17 years | 43.7 |
| 2012 MarketScan: 0-17 years | 43.0 |
| (Tier 3) Head injury-related Emergency Department visits (admitted or discharged) | |
| 2010 HCUP NEDS: 0-17 years (overall) | 961.4 |
| Private Insurance | 980.6 |
| Medicaid | 951.6 |
| Uninsured | 873.1 |
| 2011 HCUP NEDS: 0-17 years (overall) | 1046.8 |
| Private Insurance | 1002.3 |
| Medicaid | 1151.3 |
| Uninsured | 851.5 |
| 2012 HCUP NEDS: 0-17 years (overall) | 1142.0 |
| Private Insurance | 1043.3 |
| Medicaid | 1315.4 |
| Uninsured | 993.2 |
| 2010 MarketScan: 0-17 years | 784.7 |
| 2011 MarketScan: 0-17 years | 828.4 |
| 2012 MarketScan: 0-17 years | 854.4 |
| (Tier 4) Head injury-related office/clinic visits (not including urgent care) | |
| 2010 MarketScan: 0-17 years | 913.3 |
| 2011 MarketScan: 0-17 years | 1022.6 |
| 2012 MarketScan: 0-17 years | 1125.8 |

* Data from the Agency for Healthcare Research & Quality's Healthcare Cost and Utilization Project (HCUP) National (Nationwide) Inpatient Sample (NIS) and Nationwide Emergency Department Sample (NEDS) include *weighted* national estimates of pediatric patients with private insurance, Medicaid, and no insurance (self-pay). They represent cross-sectional administrative claims (no indication of follow-up or not in the preceding 30 or following 180 days—parameters that were included in MarketScan inclusion/exclusion criteria for reported data). MarketScan data do not include uninsured patients.

eTable 4. Annual rates of outpatient head trauma presentation per 100,000 pediatric enrollees from 2004-2013 and jointpoint regression results (AAPC= average annual percent change, APC= annual percent change)

| | Insurance | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | AAPC (%) | p-value |
|-----------------------------|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------------------|-------------------|
| Ambulatory ED* | Commercial | 282.7 | 270.6 | 254.4 | 219.6 | 232.9 | 317.6 | 317.8 | 290.8 | 312.3 | 337.5 | 3.3 (0.2-6.4) | 0.0389 |
| | Medicaid | 645.5 | 674.1 | 613.1 | 637.3 | 641.8 | 852.2 | 792.0 | 883.0 | 783.2 | 733.2 | 2.8 (0.2-5.5) | 0.0372 |
| | Overall | 439.8 | 455.4 | 420.8 | 336.2 | 339.4 | 456.5 | 430.9 | 410.9 | 431.3 | 455.9 | 0.8 (-2.0 to 3.6) | 0.5505 |
| Urgent care† | Commercial | 6.6 | 8.0 | 10.6 | 11.2 | 15.4 | 21.5 | 23.8 | 27.6 | 42.6 | 50.8 | 26.6 (23.1-30.3) | <0.0001 |
| | Medicaid | 1.7 | 2.3 | 5.1 | 9.9 | 14.3 | 23.5 | 31.9* | 41.1 | 38.4 | 40.9 | 40.0 (33.4-47.0) | <0.0001 |
| | Overall | 4.5 | 5.4 | 8.1 | 10.8 | 15.1 | 22.0† | 25.7 | 30.4 | 41.6 | 47.8 | 31.5 (26.6-36.7) | <0.0001 |
| Office/Clinic visit‡ | Commercial | 614.1 | 624.2 | 698.9 | 787.3 | 804.5 | 1048.7 | 1012.5 | 1131.2 | 1232.3 | 1204.4 | 8.6 (6.5-10.7) | <0.0001 |
| | Medicaid | 528.3 | 429.2 | 406.9‡ | 454.8 | 466.4 | 525.5 | 596.5 | 595.5 | 810.9 | 759.6 | 5.0 (-1.4 to 11.9) | 0.1283 |
| | Overall | 577.0 | 534.9 | 563.5 | 694.5 | 716.5 | 912.8 | 913.3 | 1022.6 | 1125.8 | 1071.3 | 9.1 (6.8-11.4) | <0.0001 |
| Any presentation | Commercial | 903.4 | 902.8 | 964.0 | 1018.1 | 1052.8 | 1387.9 | 1354.1 | 1449.6 | 1587.2 | 1592.6 | 7.6 (5.7-9.6) | <0.0001 |
| | Medicaid | 1175.6 | 1105.6 | 1025.2 | 1102.1 | 1122.4 | 1401.2 | 1420.4 | 1519.5 | 1632.5 | 1533.8 | 5.0 (2.9-7.1) | 0.0005 |
| | Overall | 1021.3 | 995.7 | 992.4 | 1041.5 | 1070.9 | 1391.3 | 1369.9 | 1463.8 | 1598.6 | 1575.0 | 6.5 (4.6-8.5) | <0.0001 |

Depicted graphically in Figure 3a-b. Temporal trends were examined by year from 2004-2013, stratified by location and insurance, using joinpoint regression. Up to two joinpoints were allowed.

* APC 2004-2010: 62.0%, p<0.001; APC 2010-2013: 4.7%, p=0.193

† APC 2004-2009: 38.7%, p<0.001; APC 2009-2013: 23.1%, p<0.001

‡ APC 2004-2006: -12.6%, p=0.313; APC 2006-2013: 10.7%, p<0.001

eTable 5. Monthly rates of outpatient head trauma presentation per 100,000 pediatric enrollees from January 2010-December 2013

| | Commercial | Medicaid | Overall |
|--------|-------------------|-----------------|----------------|
| Jan10 | 133.8 | 134.0 | 133.8 |
| Feb10 | 117.0 | 135.1 | 121.2 |
| Mar10 | 134.2 | 161.7 | 140.7 |
| Apr10 | 142.3 | 176.1 | 150.4 |
| May10 | 151.1 | 183.8 | 158.9 |
| Jun10 | 126.2 | 143.2 | 130.3 |
| Jul10 | 114.4 | 134.3 | 119.2 |
| Aug10 | 127.7 | 151.2 | 133.3 |
| Sept10 | 173.6 | 182.8 | 175.8 |
| Oct10 | 184.2 | 184.1 | 184.2 |
| Nov10 | 129.5 | 146.1 | 133.5 |
| Dec10 | 114.4 | 122.1 | 116.3 |
| Jan11 | 137.3 | 133.9 | 136.6 |
| Feb11 | 125.2 | 138.5 | 127.8 |
| Mar11 | 139.8 | 173.9 | 146.7 |
| Apr11 | 140.8 | 174.0 | 147.5 |
| May11 | 155.2 | 187.8 | 161.8 |
| Jun11 | 127.7 | 151.1 | 132.5 |
| Jul11 | 120.1 | 148.6 | 126.0 |
| Aug11 | 149.5 | 171.3 | 154.1 |
| Sept11 | 199.9 | 204.4 | 200.9 |
| Oct11 | 200.0 | 196.4 | 199.3 |
| Nov11 | 144.2 | 164.9 | 148.6 |
| Dec11 | 133.8 | 138.1 | 134.7 |
| Jan12 | 158.3 | 160.7 | 158.9 |
| Feb12 | 148.4 | 156.1 | 150.3 |
| Mar12 | 163.2 | 194.1 | 171.1 |
| Apr12 | 162.5 | 185.6 | 168.4 |
| May12 | 177.0 | 195.5 | 181.8 |
| Jun12 | 135.2 | 153.3 | 139.9 |
| Jul12 | 123.8 | 144.7 | 129.3 |
| Aug12 | 158.2 | 168.3 | 160.9 |
| Sept12 | 210.6 | 192.8 | 205.8 |
| Oct12 | 222.4 | 199.6 | 216.3 |
| Nov12 | 151.7 | 151.6 | 151.7 |
| Dec12 | 135.0 | 131.7 | 134.1 |
| Jan13 | 161.1 | 148.9 | 157.5 |
| Feb13 | 142.5 | 135.2 | 140.3 |
| Mar13 | 146.4 | 153.2 | 148.5 |
| Apr13 | 167.7 | 170.9 | 168.7 |
| May13 | 179.6 | 182.6 | 180.5 |
| Jun13 | 134.0 | 144.0 | 137.1 |
| Jul13 | 122.9 | 134.3 | 126.4 |

| | | | |
|--------|-------|-------|-------|
| Aug13 | 156.1 | 161.6 | 157.8 |
| Sept13 | 219.4 | 196.1 | 212.1 |
| Oct13 | 233.1 | 198.3 | 222.2 |
| Nov13 | 155.9 | 150.3 | 154.1 |
| Dec13 | 131.2 | 129.9 | 130.8 |

Depicted graphically in Figure 3c.